MITSUBISHI ELECTRIC

Data Projector

XD480U / XD450U / XD400U

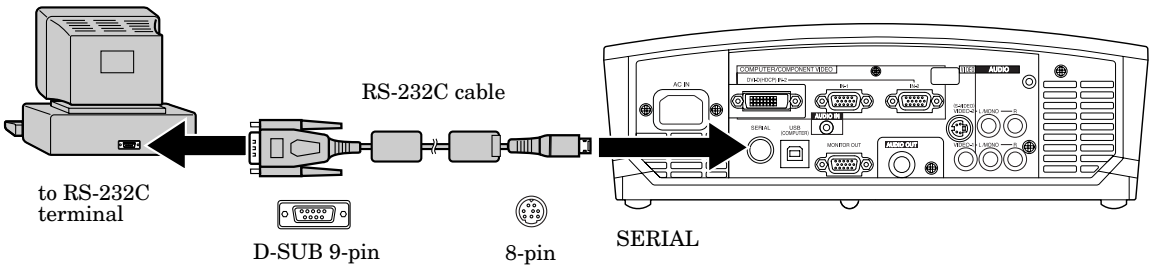
Controling the projector using a personal computer

This projector can be controlled by connecting a personal computer with RS-232C terminal.

PC-controllable functions :

- Turning the power ON or OFF
- Changing input signals
- Inputting commands by pressing the buttons on the control panel and remote control
- Menu setting

Connection



Important:

- Make sure that your computer and projector are turned off before connection.
- Boot up the computer first, and then plug the power cord of the projector.
  (If you do not follow this instruction, the Comport may not function.)
- Adapters may be necessary depending on the PC connected to this projector. Contact your dealer for details.

1) Interface

PROTOCOL	RS-232C
BAUD RATE	9600 [bps]
DATA LENGTH	8 [bits]
PARITY BIT	NONE
STOP BIT	1 [bit]
FLOW CONTROL	NONE

This projector uses RXD, TXD and GND lines for RS-232C control.
For RS-232C cable,the reverse type cable should be used.

2) Control command diagram

The command consists of the address code, function code, data code, and end code. The length of the command varies among the functions.

	Address code	Function code	Data code	End code
HEX	30h 30h	Function	Data	0Dh
ASCII	'0' '0'	Function	Data	↵

[Address code] 30h 30h (In ASCII code, '0' '0') fixed.
[Function code] A code of each fixed control move.
[Data code] A code of each fixed control data (number) and not always indicated.
[End code] 0Dh (In ASCII code, '↵') fixed.

3) Control sequence

(1) Send the command from the personal computer to the projector.
(2) The projector will send a return command after it receives an end code. If the command is not received correctly, the projector will not send the return command.
(3) The personal computer checks the command and confirms if the sent command has been executed or not.
(4) This projector sends various codes other than the return code. When having a control sequence by RS-232C, reject other codes from the personal computer.

- During signal switching, the command may not take effect even when the projector sends the return command. After signal switching completes, wait for the mode indication to disappear before sending the next command.
- When sending commands successively, wait to receive the return command of the current command before sending a next command.
- Keep intervals of at least 400 ms between receipt of a return command and sending of a next command.

[Example] When turning the power ON (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 21 0D '0' '0' '!' '↵'		Command for POWER ON
	30 30 21 0D '0' '0' '!' '↵'	Command receipt confirmation (Command echo back)

- Any commands will not be executed for 10 seconds after the power is turned on.

4) Operation commands (Not executable in stand-by mode. When the commands for input select are sent while the splash screen is being displayed, the splash screen is only canceled.)

The operation commands are used for the basic operation setting of this projector. They may not be executed while the signals are changed. The operation commands have no data codes.

Operation	ASCII	HEX	Note
POWER ON	!	21h	This command is invalid for 1 minute after the power is turned off.
POWER OFF	"	22h	This command is invalid for 1 minute after the power is turned on.
INPUT COMPUTER 1	_r1	5Fh 72h 31h	This command will not be executed in Stand-by mode or the MUTE is executed.
INPUT COMPUTER 2	_r2	5Fh 72h 32h	This command will not be executed in Stand-by mode or the MUTE is executed.
INPUT DVI*	_d1	5Fh 64h 31h	This command will not be executed in Stand-by mode or the MUTE is executed.
INPUT VIDEO 1	_v1	5Fh 76h 31h	This command will not be executed in Stand-by mode or the MUTE is executed.
INPUT VIDEO 2	_v2	5Fh 76h 32h	This command will not be executed in Stand-by mode or the MUTE is executed.

*) For XD480U, XD450U only

[Example] When setting the input signal to COMPUTER 1 (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 5F 72 31 0D '0' '0' '_' 'r' '1' '↵'		Command for setting the input signal to COMPUTER 1
	30 30 5F 72 31 0D '0' '0' '_' 'r' '1' '↵'	Command receipt confirmation (Command echo back)

5) Volume commands (Not executable in stand-by mode. Possible only to read during muting.)

The volume commands are used for the volume setting of this projector with the value.

ITEM	ASCII	HEX	VALUE
VOLUME	VL	56h 4Ch	**00 - 21**

How to set the grade

Use the ASCII codes to set the grade for setting data. Please refer to the table below for the HEX code.

ASCII	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	'8'	'9'
HEX	30h	31h	32h	33h	34h	35h	36h	37h	38h	39h

[Example] When setting the volume to 15 (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 56 4C 31 35 0D '0' '0' 'V' 'L' '1' '5' '↵'		Command for setting the volume
	30 30 56 4C 31 35 0D '0' '0' 'V' 'L' '1' '5' '↵'	Command receipt confirmation (Command echo back)

6) Keystone commands (Not executable in stand-by mode. Possible only to read during muting.)

The keystone commands are used for the keystone setting of this projector with the value. The value will vary depending on the installation conditions, etc.)

ITEM	ASCII	HEX	VALUE
KEYSTONE(vertical)	KS	4Bh 53h	**±45**
KEYSTONE(horizontal)	KSH	4Bh 53h 48h	**±33**

How to set the grade

Use the ASCII codes to set the grade for setting data. Please refer to the table below for the HEX code.

ASCII	'+'	'–'	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	'8'	'9'
HEX	2Bh	2Dh	30h	31h	32h	33h	34h	35h	36h	37h	38h	39h

7) Mute commands (Not executable in stand-by mode. When the mute commands are sent while the splash screen is being displayed, the splash screen is not muted but only canceled.)

The mute commands are used for the mute setting of this projector with the 0(30h) and 1(31h).

ITEM	ASCII	HEX	VALUE
MUTE	MUTE	4Dh 55h 54h 45h	**0** (OFF), **1** (ON)

8) Remote commands (Not executable in stand-by mode. When the remote commands are sent while the splash screen is being displayed, the splash screen is only canceled.)

Some remote control operations can be achieved by the remote command codes. The remote commands have no data codes.

Button's name on remote	ASCII	HEX
+ VOLUME	r06	72h 30h 36h
– VOLUME	r07	72h 30h 37h
KEYSTONE	r43	72h 34h 33h
EXPAND	r02	72h 30h 32h
PinP	r04	72h 30h 34h
MUTE	ra6	72h 61h 36h
▲	r53	72h 35h 33h
▼	r2b	72h 32h 62h
◀	r4f	72h 34h 66h
▶	r59	72h 35h 39h
MENU	r54	72h 35h 34h
ENTER	r10	72h 31h 30h
AUTO POSITION	r09	72h 30h 39h
STILL	ra4	72h 61h 34h
16 : 9	re2	72h 65h 32h

[Example] When displaying the MENU selection bar (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 72 35 34 0D '0' '0' 'r' '5' '4' '↵'		Command operating the same as the MENU button
	30 30 72 35 34 0D '0' '0' 'r' '5' '4' '↵'	Command receipt confirmation (Command echo back)

9) Password lock commands

The password lock commands control the password lock. The password lock enabling or disabling command is sent with a 4-digit figure (password) added to the end of the data code. When the password lock is enabled or disabled successfully, the projector sends a return command comprising the data code, password, and "1" at the end. When enabling or disabling the password lock fails, it sends a return command with "0" at the end. There is no reconfirmation of the password. The password input command is for enabling projection of image when password lock has been set to DISPLAY INPUT. The password input command is sent with a 4-digit figure (password) at the end.

ITEM	ASCII	HEX	VALUE
Password lock enabling/ disabling	PSLOCK	50h 53h 4Ch 4Fh 43h 4Bh	0****(Disabling), 1****(DISPLAY INPUT) 2****(MENU ACCESS), 3****(SPLASH ID SCREEN)
Password input	PASS	50h 41h 53h 53h	****

**** is a 4-digit figure (password).

10) Reading command diagram

The projectors operating status, such as POWER-ON / OFF and the currently selected input terminal, etc. can be monitored.

	ASCII		HEX	
	Function	Data (Receive)	Function	Data (Receive)
POWER ON	vP	1	76h 50h	31h
POWER OFF	vP	0	76h 50h	30h
INPUT COMPUTER 1	vI	r1	76h 49h	72h 31h
INPUT COMPUTER 2	vI	r2	76h 49h	72h 32h
INPUT DVI*	vI	d1	76h 49h	64h 31h
INPUT VIDEO 1	vI	v1	76h 49h	76h 31h
INPUT VIDEO 2	vI	v2	76h 49h	76h 32h
POWER ON/OFF INPOSSIBLE	vPK	0	76h 50h 4Bh	30h
POWER ON/OFF POSSIBLE	vPK	1	76h 50h 4Bh	31h
NO SIGNAL SUPPLIED	vSM	0	76h 53h 4Dh	30h
SIGNAL SUPPLIED	vSM	1	76h 53h 4Dh	31h

*) For XD480U, XD450U only

The PC sends the command without attaching the data code to it. On the other hand, the projector attaches to the received command it's current operating status as the data code and send it back to the PC.
[Example] When checking the currently selected input terminal (when the INPUT VIDEO 1 is being selected) :

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 76 49 0D '0' '0' 'v' 'I' '↵'		Command for checking the input terminal
	30 30 76 49 76 31 0D '0' '0' 'v' 'I' 'v' '1' '↵'	Check result (VIDEO 1)

11) Menu setting commands (Not executable in stand-by mode. Possible only to read during muting.)

The menu setting commands are used for the menu setting of this projector. If the personal computer sends the command without attaching the data code, the projector attaches to the received command it's current setting value as the data code and send it back to the PC.

ITEM	ASCII	HEX	VALUE
CONTRAST *1	P	50h	**±30±30±30**(R from G+Main data+B from G)
BRIGHTNESS *1	Q	51h	**±30±30±30**(R from G+Main data+B from G)
CineRichColor	WEH	57h 45h 48h	**00 - 10** , **11**(AUTO)
sRGB	SRGB	53h 52h 47h 42h	**0** (OFF), **1** (ON)
COLOR MATRIX (MODE)	CMT	43h 4Dh 54h	**1** (VIDEO), **2** (COMPUTER), **3** (USER), **4** (OFF)
COLOR MATRIX (R, G, B)	MRGB	4Dh 52h 47h 42h	**±30±30±30** (R+G+B)
COLOR MATRIX (Y, C, M)	MYCM	4Dh 59h 43h 4Dh	**±30±30±30** (Y+C+M)
COLOR MATRIX (RGB-TINT)	MT	4Dh 54h	**±20**
COLOR TEMP.	A	41h	**1** (STANDARD), **2** (HIGH), **3** (LOW), **4** (USER)
COLOR	T	54h	**±10**
TINT	S	53h	**±10**
SHARPNESS	R	52h	**±05**
GAMMA MODE	GS	47h 53h	**0** (DYNAMIC), **1** (STANDARD), **2** (THEATER), **3** (AUTO)
AUTO POWER ON	APON	41h 50h 4Fh 4Eh	**0** (OFF), **1** (ON)
AUTO POWER OFF	APOF	41h 50h 4Fh 46h	**00** (OFF) , **05**, **10**, **15**, **30**, **60**
SPLASH SCREEN	SS	53h 53h	**0** (OFF), **1** (ON)
BACK COLOR	BB	42h 42h	**0** (BLACK), **1** (BLUE), **2** (IMAGE)
MUTE MODE	MM	4Dh 4Dh	**0** (BLACK), **1** (IMAGE)
LAMP MODE	LM	4Ch 4Dh	**0** (STANDARD), **1** (LOW) : For XD480U, XD450U only.
IMAGE REVERSE	IR	49h 52h	**0** (OFF), **1** (MIRROR), **2** (INVERT), **3** (MIRROR, INVERT)
MENU POSITION	MP	4Dh 50h	**0** (Upper left), **1** (Lower right)
EXPAND MODE	EX	45h 58h	**0** (Expand), **1** (Real)
CINEMA MODE	CINE	43h 49h 4Eh 45h	**0** (OFF), **1** (AUTO)
VIDEO SIGNAL	VS	56h 53h	**0** (AUTO), **1** (NTSC), **2** (PAL), **3** (SECAM) , **4** (4.43NTSC), **5** (PAL-M), **6** (PAL-N), **7** (PAL-60)
SCART	SRT	53h 52h 54h	**0** (OFF), **1** (ON)
ANAMORPHIC	SC	53h 43h	**0** (OFF), **1** (CENTER), **2** (UPPER), **3** (LOWER)
LANGUAGE	LG	4Ch 47h	**0** (日本語), **1** (English), **2** (Español), **3** (Deutsch) , **4** (Français), **5** (Italiano),**6** (中文), **7** (한국어), **8** (РУССКИЙ), **9**(PORTUGUÊS)
RESET ALL	RSTALL	52h 53h 54h 41h 4Ch 4Ch	
FINE SYNC.	FN	46h 4Eh	**00 - 31**
COMPUTER INPUT	CIN	43h 49h 4Eh	**0** (RGB), **1** (YCBCR/YPBPR)
HOLD	HLD	48h 4Ch 44h	**0** (OFF), **1** (ON)
HOLD BEGIN	HLB	48h 4Ch 42h	**00 - 15**
HOLD END	HLE	48h 4Ch 45h	**00 - 15**

ITEM	ASCII	HEX				VALUE
CLAMP POSITION	CLP	43h	4Ch	50h		**00 - 63**
CLAMP WIDTH	CLW	43h	4Ch	57h		**01 - 63**
VERT. SYNC.	VSC	56h	53h	43h		**0** (AUTO), **1** (OFF)
SHUTTER (U)	SHU	53h	48h	55h		**00 - 20**
SHUTTER (L)	SHL	53h	48h	4Ch		**00 - 20**
SHUTTER (LS)	SHLS	53h	48h	4Ch	53h	**00 - 20**
SHUTTER (RS)	SHRS	53h	48h	52h	53h	**00 - 20**

*1) When sRGB is ON, only the main data are effective.

- Some commands are not executed depending on the input signal. The operational restrictions same as those on the menu setting are applied. Refer to “Menu operation” in the User Manual for more details.

How to set the grade

Use the ASCII codes to set the grade for setting data. Please refer to the table below for the HEX code.

ASCII	'+'	'–'	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	'8'	'9'
HEX	2Bh	2Dh	30h	31h	32h	33h	34h	35h	36h	37h	38h	39h

[Example 1] When setting the AUTO POWER ON to ON. (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 41 50 4F 4E 31 0D '0' '0' 'A' 'P' 'O' 'N' '1' '↵'		Command for setting the AUTO POWER ON to ON
	30 30 41 50 4F 4E 31 0D '0' '0' 'A' 'P' 'O' 'N' '1' '↵'	Command receipt confirmation (Command echo back)

The data code of CONTRAST and BRIGHTNESS consists of the difference data between R and G, the main data, and the difference data between B and G.

[Example 2] When setting the difference data between R and G to +10, the main data to 0, and the difference data between B and G to -5. (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 50 2B 31 30 2B 30 30 2D 30 35 0D '0' '0' 'P' '+' '1' '0' '+' '0' '0' '-' '0' '5' '↵'		Command for setting the picture control
	30 30 50 2B 31 30 2B 30 30 2D 30 35 0D '0' '0' 'P' '+' '1' '0' '+' '0' '0' '-' '0' '5' '↵'	Command receipt confirmation (Command echo back)

[Example 3] When checking the TINT setting (when the TINT is set to +10). (Figures and symbols enclosed in quotation marks are ASCII codes.):

Sending commands from the PC, etc.	Status code from the projector	Description
30 30 53 0D '0' '0' 'S' '↵'		Command for checking the TINT setting
	30 30 53 2B 31 30 0D '0' '0' 'S' '+' '1' '0' '↵'	Check result (+10)